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AUTHOR Contreras, Juan; Llamas, Rafael; Vizcaino, Aurora; Vavela, Jesus

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ABSTRACT

Casual encounters in a learning environment are very useful in reinforcing previous knowledge and acquiring new knowledge. Such encounters are very common in traditional learning environments and can be used successfully in social environments in which students can discover and construct knowledge through a process of dialogue, negotiation, or sharing. In the context of these casual encounters, the INCA system was developed which informs the user who accesses a World Wide Web site of the presence of other participants and the messages they have exchanged with each other. The system allows students to interact with other people reading course-related documents within the site at the same time. The system will be used in a distance education class in a collaboration among the Massachusetts Institute of Technology, the Pontificia Universidad Catolica de Chile, and the Centro de Investigacion Cientifica y de Educacion Superior de Ensenada (Mexico). (Author/MES)

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Improving Collaborative Learning by Supporting Casual Encounters in Distance Learning

Juan Contreras[1]
Telematics Department
Universidad de Colima
México
juancont@ucol.mx

Rafael Llamas, Jesús Favela[2]
Computer Sciences Department
CICESE
México
{rllamas, favela}@cicese.mx

Aurora Vizcaíno[3]
Informatics Department
Universidad de Castilla-La Mancha
España
avizcain@inf-cr.uclm.es

G.H. Marks

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Abstract: Casual encounters, in a learning environment, are very useful in reinforcing previous knowledge and acquiring new knowledge. Such encounters are very common in traditional learning environments and can be used successfully in social environments, in which students can discover and construct knowledge through a process of dialogue, negotiation or sharing. In the context of these casual encounters we developed a system that informs the user who accesses a web site of the presence of other participants and the messages they have exchanged with each other in order to interact with other people reading course-related documents within the site at the same time. The system will be used in a distance education class in collaboration between the Massachusetts Institute of Technology (MIT), the Pontificia Universidad Católica de Chile (PUC), and the Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE).

Introduction

In the last few years, we have seen an increment in online courses, video-conferencing courses, and courses that combine both technologies, offered by different universities, in which students from all over the world can receive, participate and collaborate with other students in different cities or countries.

However, most of the casual encounters and social interactions that occur in a traditional learning environment, in which students are taking coursework on a university campus, are lost in these distance education environments. In these casual encounters in which the conversation topic, duration

[1] Currently a doctoral student at CICESE.
[2] Fourth author
[3] Third author

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and number of participants are not defined, a rich information exchange occurs between students and professors (Kraut, 1990). Some of the characteristics of these encounters are the following (Isaacs, 1997):

- Brevity: The duration of the interaction may be seconds, a couple of minutes, or 15 minutes, at the most.
- Informality: Conversations do not include formal greetings or leave-takings.
- Spontaneity: Interactions is what may be called opportunistic, not planned, although it can be planned by either party.
- Intermittence: The purposes of interpersonal interactions are seldom achieved in one interchange, so that such conversations occur over intermittent episodes (Whittaker, 1994), with participants on average interacting with each other 2.5 times per day.

Casual encounters, in a learning environment, are very useful in reinforcing previous knowledge or in acquiring new knowledge. Most researchers believe that knowledge can be acquired successfully in social environments, in which students can discover and construct knowledge through a process of dialogue, negotiation or sharing (Boekaerts, 1998), for example, when students are waiting to take an exam and are together in the room where the exam will be held (perhaps some of them have never even met before), they begin to talk with each other about doubts, and possible questions, commenting on ideas and exchanging information. In some cases, with this communication, students can understand concepts that were not completely clear to them previously and, as a result, improve their performance in the exam.

In the case of distributed collaborative learning, due to the distance and the distribution of students, casual encounters are very rare, and students cannot interact with each other as if they where in the same campus, and in general their only recourse is to attend formal meetings in order to talk about the class meetings with a definite topic and at a particular time, and they cannot talk freely about other class topics.

In the next section we discuss a distance learning course that was given through video-conference between CICESE (Centro de Investigación Científica y Educación Superior de Ensenada) and MIT (Massachusetts Institute of Technology). In section 3 we introduce brief descriptions of systems that support casual encounters in distributed environments. In section 4 we discuss the implementation of a system that supports casual encounters in a web-based environment and will be used in the distributed software engineering class and, finally, we present our conclusions and future work in the development of new courses and systems that can take advantage of the characteristics of the system implemented.

A Distance Learning Course in Distributed Software Engineering

The main objective of this course was for students to experience the software development process in a company with a project from a real client. The client was interviewed by the students to present the project that he wanted to develop and then professors assigned the roles that students would play in the software development company.

In this course we had a group of 14 students, four at CICESE (Centro de Investigación Científica y Educación de Ensenada) and ten at MIT (Massachusetts Institute of Technology). The course was taught through video-conference, with two classes per week, one theory class and a lab. Each class lasted two hours. Theoretical classes were given in alternate weeks at each site.

The Software Engineering class created a web site to publish all the documents generated during the course. It also had an e-mail list with all the participants, used to exchange information between all members of the group. We stored all the e-mail messages sent through this list in a web site.

It was possible for all members of the group to check all the information and tasks assigned to them.

All the students in this class were assigned a role as if they were part of a software development company (i.e., analyst, designer, programmer, etc.). To assign the roles all the students were asked to select two main roles they wanted to play in the class. The professor considered the selections made by the students, and the skills that each student had to best accomplish the work assigned to each role.

The short informal conversations that normally take place in the halls, which allow participants to exchange valuable information, in this case, took place through chats, via e-mail and ICQ messages. Between professors and students, such conversations took place through e-mail and video-conference but were less frequent.

The course attempted to promote interaction through group division by geographically distributing all the roles. That is, the group in each location was subdivided with two members at MIT and one at CICESE for each of the subgroups. Each group had a leader in charge of its organization and coordination. Based on this course and because of a need to find further support for casual encounters we revised several systems so that they could be utilized to improve students performance in distance learning classes.

Systems that support casual encounters

Several computer based systems have been developed to support casual interaction, but they have been used only in office environments. Some of these are the following: Piazza (Isaacs, 1996), whose approach is to use networked computers to provide opportunities to encounter others through tasks and activities accomplished on-line; Cruiser (Fish, 1989), which provides innovative mechanisms for initiating connections between users to encourage frequent, informal, and unplanned communication among a large but selected group of members of a distributed community; Ubique (http://www.ubique.com), a system that provides virtual places that allows users to see graphical representations of others browsing the same web page at the same time and to open up a text or audio chat with them, and which also offers mechanisms for navigation through Web pages together; Telenotes (Whittaker 1997), is a system designed to support lightweight interactions through conversational tracking, rapid connection, the ability to leave a message, context management, and shared real time objects. However, some of these systems require the use of special software or hardware and require, also, that people come together at a specified online "place in the network to see others (Isaacs, 1996). This approach is acceptable within a homogeneous environment where all users are using the same client-server. Only one of these systems provides mechanisms for casual encounters in web sites. With this in mind we developed a system to motivate learning produced by the interaction among people visiting the same web site. In the next section we discuss the structure and implications of this system.

The INCA system

In the context of these casual encounters we developed a system that informs the user who accesses a web site of the presence of other participants and the messages they have exchanged with each other in order to interact with other people reading course-related documents within the site at the same time. The goal of INCA is to motivate learning, produced by the interaction among people interested in similar topics. The interaction takes place when the user realizes that another person is reading the same or a related document and decides to initiate a chat or a video-conference session with him.

The main requirements to be provided by INCA were:

1. Support for informal interaction.
2. Recreate a traditional library system, in which one can meet with other people reading the same book or document.
3. Provision of audio and video resources to permit users to communicate with each other.
4. Navigation within the site that would be as natural as possible. As If there wasn't no other system, just the web browser.

The INCA system uses several servers (Web Server, Awareness Server and Collaboration Server) which delivers the different Web Pages and announces new users that connect to the web site. The server takes the real name, nickname and e-mail address from the users registration information on the main page of the site. When a user logs into the system, the web server sends the registration information to the awareness server and requests information about other users already connected and announces the new user to other users connected, then it sends to the new user all stored information about other users. Each time a user logs off the system by loading a page that is not in the site, all other users connected are notified and their user's menu is refreshed. In fig 1, we can see a typical scenario for a user connection and the interaction between the different components of the system that lead to a casual interaction through the INCA system in a web site.

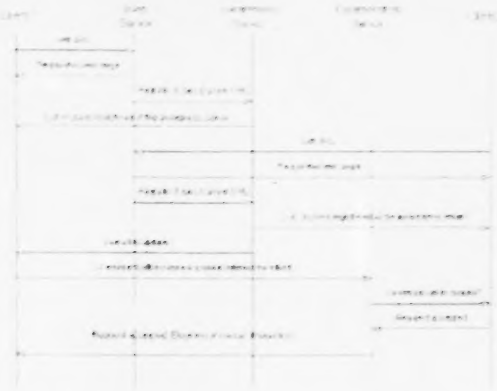

Fig. 1 A typical scenario for a user connection

In fig. 2 we can see the INCA system architecture for an interaction request and interaction acceptance for two users.

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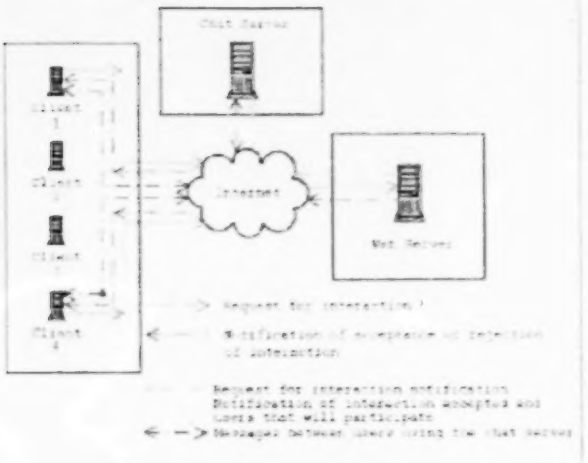

Fig. 2. An architectural view of an interaction in the INCA system.

In fig. 3 we can see the site in which the INCA system was installed to test its functionality and we can also see an interaction between 2 users using the chat. A user connected to the system can navigate normally through the web site, by clicking on a small button attached to a frame on the left side of the web browser, the user also has the option of seeing pictures of other users who are connected, by pressing a button, that opens a small window showing all the users nicknames and allows one to select a user. Once a user is selected, a window pops up showing the user information and containing three buttons that permit starting a chat conversation, establishing a video-conference or cancellation. The system presently accepts all video connections, but it will be changed so that, as in the chat request, the user may accept or reject the connection.

While users interact with each other, they have the option of synchronizing their web browsers to navigate on the web site. Then the chat or video-conferencing subsystems can be used to exchange comments about the information they are browsing. To stop interacting a user can simply close the chat or video-conferencing window or press the finish button.

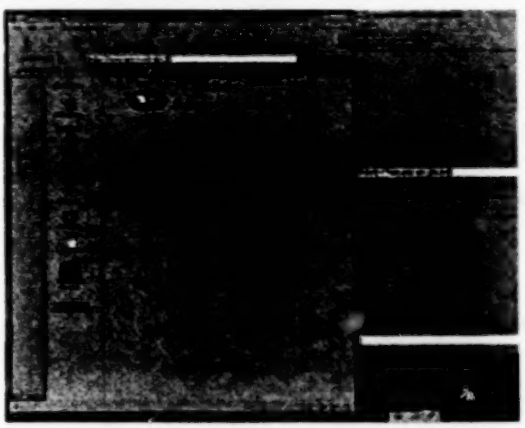

Fig. 3 Test of INCA's system functionality

In fig. 4 we can see an interaction between two users with the video-conference subsystem.

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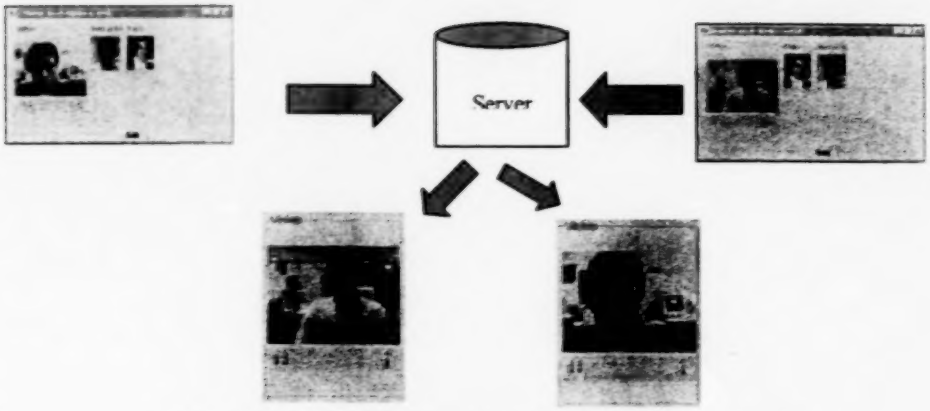

Fig. 4. Interaction between two users using the video-conference subsystem.

The INCA system will be used in the next edition of the distributed software engineering class in collaboration between the Massachusetts Institute of Technology (MIT), Pontificia Universidad Católica de Chile (PUC), and Centro de Investigación Científica y Educación Superior de Ensenada (CICESE).

Conclusions

In this paper we discussed the importance of casual encounters in a distributed learning environment since they allow a rich information exchange between students. We presented some systems that have been used only in office environments that support this type of encounters and only one of them permits the use of web-based environments. We also presented a system that permits casual encounters in web-based distance classes and informs the user of other people connected at the same time and allows them to establish an interaction among two or more users.

We think that the development of this system to support our distance learning courses will allow students to better understand the course material and as a result improve their performance in the classes because they can consult other students or professors about their doubts or solve problems in groups.

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